

Chapter 4.0 – Environmental Consequences

This Chapter describes the potential consequences or effects specific to the Issues described in Chapter 1, the Alternatives in Chapter 2, and the Affected Environment in Chapter 3.

4.1 Public Health and Safety/Issue: Air Quality and Control of Wildland Fire

Effect of Alternative 1 on Health and Safety/Air Quality/Wildland Fires

Under the No Action Alternative, air quality standards will not be exceeded with this project; there would be no direct effects to health and safety from smoke.

Potential indirect effects to health and safety would occur when a wildfire escapes initial attack efforts and burns in heavy fuels. Smoke from such large wildfires is unmanageable and the severity of air quality degradation/health risks is unpredictable. Large, uncharacteristic fires may pose a risk to forest visitors and trails and areas of the forest may be closed. Private lands, structures, and regional communities could also be threatened by a wildfire. The Northwest Wyoming Community College field station, air quality and visibility monitoring station, private property, houses, cabins, fences and power lines all exist adjacent to the proposed project area and could be at increased risk if a large, uncontrollable crown fire occurred.

In urban-rural wildland interface areas, the cost of suppressing large uncontrollable wildfires and rehabilitating watersheds to reduce the post-wildfire threat to life and property, loss of long-term soil productivity and deteriorated water quality can exceed millions of dollars.

The greatest health and safety concern is if and when a wildfire escapes initial attack efforts and burns in heavy fuels. Smoke from such large wildfires is unmanageable and the severity of air quality degradation/health risks is increased. Safety, private lands, structures, and regional communities are also at an increased risk from a wildfire. The Northwest Wyoming Community College Field Station, air quality and visibility monitoring station, private property, houses, cabins, fences and power lines all exist adjacent to the proposed project areas.

The current fuels load indicates a high risk of extensive stand-replacement fire within the project area under a no-action approach. Public safety and air quality would be severely compromised if such a wildfire were to occur.

Effect of Alternative 2 and 3 on Health and Safety/Air Quality/Wildland Fires

The action alternatives are intended to reduce the risk of large wildfires, where there are threats to life and private property. When implemented, the risk from an escaped wildfire affecting the Northwest Wyoming Community College Field Station, air quality and visibility monitoring station, private property, houses, cabins, fences and power lines would be reduced due to the fuel breaks.

The agency acknowledges that smoke created by burning activities would temporarily reduce air quality. The prescribed burn plan addresses smoke management and compliance with the state's air

quality permitting system and with the air quality standards.

There is risk of an escaped fire during prescribed burning. However, this risk is minimized as prescribed burning would be implemented only under very controlled conditions that account for weather, moisture, fuel and fire behavior parameters, and provide sufficient control and backup suppression resources of personnel and equipment. The risk of an escaped fire occurring during prescribed burning can be reduced through careful management, so as to be well worth the benefits gained from such a program. Prior to ignition, a site-specific management ignited prescribed fire burn plan would be prepared to address safety parameters.

4.2 Aesthetics/Issue: Visual Quality and Recreation

Insect and disease can result in large areas of dead trees. Stands of predominantly dead trees can then become fire hazards, indirectly increasing the potential for wildfire effects to scenic resources.

Effect of Alternative 1 on Visual Quality and Recreation

Under the No Action Alternative, there would be no direct effects to air quality or recreation. Visual quality along the Chief Joseph Scenic Byway would not be enhanced by the removal of the dead and dying trees under this alternative. Smoke from such large wildfires is unmanageable and the severity of air quality degradation is unpredictable. Large fires may reduce the quality of forest recreation experiences as vistas may be obscured by smoke and haze. Regional communities could also be obscured by smoke and haze.

Effect of Alternative 2 and 3 on Visual Quality and Recreation

Direct effects from prescribed burning would be the removal of above ground matter immediately following the burn; blackened areas would remain visible for a short time. During burning, visual quality and recreation opportunities would be diminished and there would be a temporary reduction in solitude and the feeling of remoteness.

Prescribed fire can result in temporary visibility impairment from smoke. Smoke from fires can partially or completely obscure scenic attractions. Prescribed fires usually result in both short-term and long-term visual effects in the form of landscapes having burned appearances. In many cases, fires are designed to mimic historical fires in post-fire appearance. However, many people find the post-fire appearance of burned vegetation to be unattractive. Prescribed fire is generally used in areas comprised of vegetation characterized by mixed fire regimes to maintain early successional stages. In these circumstances, fire intensity, severity, and scale are generally low and small and result in less visual impacts of shorter duration than wildland fire events. In some cases, fire may be used to improve scenic quality. For instance, fire can be used to reduce slash or to achieve timber stand characteristics that are more visually appealing, such as open stands of large trees or the removal of dead trees.

Removing approximately 60% of standing dead and dying open grown limber pines would improve scenic quality in the limber pine stands.

The visual quality objectives for retention would be met through prescribed burning a mosaic pattern that repeats form and line so that it is congruent with the characteristic landscape. The long-term project objective is landscape improvement or enhancement, so relatively short term changes to color and texture are within Forest Plan standards and guidelines for visual improvement.

The visual quality objectives for partial retention allow for activities that are visually subordinate to the characteristic landscape. Prescribed burning a mosaic pattern that repeats form and line and is congruent with the landscape would result in an activity that remains subordinate to the characteristic landscape, especially in the long-term.

Helicopter use in Dead Indian unit 1 would have a direct, temporary effect on aesthetics. People would be displaced for short periods of time during burning activities. Indirectly, it affects fall archery and rifle hunting seasons by the temporary displacement of game animals in the immediate vicinity and smoke and haze. The quality of the hunts would be degraded and as animals are displaced, hunter success may also decline in the immediate vicinity.

Noise and a loss of solitude would result from helicopter use any time of the year. Only one of the units within the wilderness would be ignited by helicopter use. Due to their proximity, two treatment units (Dead Indian units 1 and 4) totaling 686 acres that are within the wilderness area would be temporarily affected by noise and loss of solitude.

4.3 Vegetation/Issue: Vegetation, Fire History, and Fuel Loading

4.3.1 Vegetation

Effect of Alternative 1 on Vegetation

The No Action Alternative would result in long-term effects. This alternative does not move toward the more natural process of fire shaping the vegetation and creating desirable mosaic patterns. Without a reduction in fuels, the Forest Service would continue to suppress virtually all new lightning caused fires in the wilderness area to protect life and property outside the wilderness area. These fire suppression actions would continue to abate the natural ecological role of fire and lead to continued modification of ecological succession, continued fuel build-up, and the increased risk of high intensity, stand-replacing fires. This is especially true within the wilderness area.

These potential stand-replacing fires have the potential for direct effects to airsheds, watersheds, aesthetics, visitor experience, wilderness values, public health and safety, and wildlife habitat (including that of threatened and endangered species). Whitebark pine, an important grizzly bear food source, would be at risk in a large, stand-replacing fire. The indirect effects include possible increases in surface and mass erosion, nutrient loading and sedimentation affecting water quality.

Effect of Alternative 2 and 3 on Vegetation/Habitat Types

The actions to reduce fuel levels would reduce the chance that large-scale wildland fire events could negatively affect resource values. The effect of fuels reduction and prescribed burning would create a vegetative mosaic pattern and firebreaks that would slow or stop wildfires and create a

more defensible fireline. The ecological effect of re-introducing fire, under controlled conditions, would allow future natural fires to play their ecological role, especially within the wilderness areas. Indirectly, the actions to reduce fuels levels would lessen the chance that large-scale wildland fire events could negatively affect resource values.

The open grown stands of the Douglas-fir and limber pine woodland habitat would vigorously respond to released nutrients. The mountain big sage interspersed in the woodlands would be back to present coverage within five to ten years. Ninebark would vigorously resprout and would form dense stands particularly in units 5 and 6 of the Bald Ridge project.

Pockets of north aspect dense Douglas-fir, lodgepole pine, and Engelmann spruce stands in the lower elevation units will regenerate within five years in openings created by the prescribed fire.

The effect of prescribed burning on the high elevation spruce-fir and scattered whitebark pine forests found in Dead Indian burn unit 5 would take five to ten years to regenerate within fire created openings. The southwest facing open grown whitebark pine stands would have existing pockets of spruce and fir regeneration removed. This would contribute to maintaining an open grown whitebark pine stand. Understory grasses and forbs already present would increase over time.

Regeneration of a portion of the timber stands (1/3 to 1/2) would be beneficial from both a vegetative condition perspective, as well as a long-term wildlife habitat component perspective. The under story grasses and forbs would also benefit from the influx of nutrients following the burn

The mountain big sagebrush/Idaho fescue habitat types should recover in five to ten years to present densities. Shrub regrowth or replacement would provide more palatable browse. Grass production would dramatically increase on these types. The exception is the steep south aspect sage community found in the Dead Indian burn unit 6. Due to the harsh site conditions, recovery of sage in this area may be longer with portions converting to a drier Idaho fescue/bluebunch wheatgrass habitat type. Areas of the Idaho fescue/Bluebunch wheatgrass habitat type and inclusions of the Shrubby Cinquefoil/Idaho fescue type would not be affected by the prescribed fire treatments as they are in areas that would not burn.

Within the wildlife diversity analysis unit (based on 14,105 acres) approximately 534 acres of the total area (4%) is composed of sagebrush/grassland. One-third to one-half of this type is proposed for treatment, or 176-acre to 267-acres (<1%), so the direct effect on mountain big sage is very minimal. Regeneration of a portion of the timber stands (1/3 to 1/2) would be beneficial from both a vegetative condition perspective, as well as a long-term wildlife habitat component perspective.

4.3.2 Fire History, Fire Effects, and Fuel Loading

Effect of Alternative 1 on Fuel Loading

The No Action Alternative would result in long-term effects. This alternative does not move toward reducing the unnatural build-up of fuels from 100 years of fire suppression or making the wilderness area more defensible. Without a reduction in fuels, the Forest Service would continue to

suppress virtually all new lightning caused fires in the wilderness area to protect life and property outside the wilderness area. These fire suppression actions would continue to abate the natural ecological role of fire and lead to continued modification of ecological succession, continued fuel build-up, and the increased risk of high intensity, stand-replacing fires. This is especially true within the wilderness area.

Effect of Alternative 2 and 3 on Fuel Loading

The proposal would mimic the historical natural fire pattern by creating a mosaic of burned and unburned vegetation. In areas of heavy fuel accumulations, fire would consume most surface fuels and may scorch tree crowns, causing tree mortality. Where fuel concentrations are not as heavy, fire would consume only some surface fuels and cause very little tree mortality. It is estimated that approximately 20% would not burn due to lack of fuels or high fuel moistures on north aspects, 50% would burn surface fuels, and 30% would burn both surface fuels and trees.

In Alternative 2 only, burn unit 3 of the Dead Indian project includes a 25-acre stand of small diameter lodgepole pine that is designated as suited for timber production. A portion of the stand may burn and some mortality may occur but would be minimized through prescribed burning techniques such as firing and holding opportunities. Any trees killed would be made available to the public as post and pole products. The area is located along an existing road.

The proposal would create a vegetative mosaic to act as a fuel break along the boundary of the North Absaroka Wilderness. Fire then may be allowed to play its natural ecological role within the wilderness. By securing this vulnerable portion of the wilderness boundary, the risk of a fire burning out of the wilderness onto private property and impacting other resources would be reduced.

As a direct effect of prescribed fire use in the Dead Indian proposal, a fuel loading reduction would result within the treatment units. Fires that occur within fuel model 6 and 10 are difficult to control with firefighters using hand tools. It is estimated that within fuel model 6 that approximately 40% of the fuel type would burn and be converted to a fuel model 1 or 8. Within fuel model 10 it is estimated that approximately 60% of the fuel type would burn and be converted mostly to fuel model 8 and some to fuel model 1.

The following table shows the estimated pre-treatment and post-treatment fuel conditions (*see* Table 2) for the Dead Indian project. It is estimated that approximately 61% of the treated area contains fuel model conditions where fire may be difficult to suppress with firefighters and hand tools. After treatment with prescribed fire, those fuel model conditions are estimated to decrease to 31% of the treated area or an estimated 50% decrease in fuel conditions that are difficult to control with ground forces. The remaining 69% of the area after treatment will contain fuel type conditions that under normal weather conditions will still carry fire but at a rate and in locations that will be easier to hold and or suppress fires within.

Table 2. Dead Indian Project

Treatment	Current Fuel Model Acres	Treated Fuel Model Acres
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Unit	1	6	8	10	1	6	8	10
Unit 1	89	90	0	68	119	54	47	27
Unit 2	11	11	6	58	23	7	33	23
Unit 3	112	228	100	22	161	137	155	9
Unit 4	51	128	135	125	98	77	214	50
Unit 5	33	0	1	101	51	0	44	40
Unit 6	95	140	4	11	125	84	37	4
Total	391	597	246	385	577	359	530	153
Percentage	24%	37%	15%	24%	36%	22%	33%	9%
Percentage Change in Fuel Model					Plus 12%	Minus 15%	Plus 18%	Minus 15%

As a direct effect of implementation of the Bald Ridge proposal, a reduction in the natural fuel loading resulting from dead limber pine would be attained. These trees and other natural fuel accumulations are creating a fuel bed that is quite volatile if a natural or human caused fire were to start. Due to its close proximity to the highway where a number of fire ignitions can originate as well as private property, fences and power lines nearby, this project is intended to reduce the fuel type to a condition where wildland fire can be suppressed by firefighters and hand tools.

The following table shows the estimated pre-treatment and post-treatment fuel conditions (*see* Table 3) for the Bald Ridge project. Within units 1, 5 and 6, prescribed fire would reduce fuel loading. In units 2, 3 and 4, the units would be open to public firewood cutting during the summer of 2001 resulting in the removal of approximately 60% of the dead and dying trees. Vehicles would be allowed to travel beyond the current 300 feet off open roads to access the firewood. The units are close enough to the open roads and highway that distances traveled would be less than 1000 feet. The area would be open only from mid July through mid August, the time period when soil conditions are usually dry and the grass has not yet cured. Trees not cut for firewood and the remaining slash would then be prescribe burned to further reduce the fuel loading. The actions would reduce the fuel model 6 fuel type by 90% to a fuel model 8 and some fuel model 1.

Table 3. Bald Ridge Project

Treatment Unit	Current Fuel Model Acres				Treated Fuel Model Acres			
	1	6	8	10	1	6	8	10
Unit 1	1	11	0	0	2	1	9	
Unit 2	2	33	0	0	4	3	28	
Unit 3	8	43	0	0	10	4	37	
Unit 4	3	36	0	0	5	4	30	
Unit 5	2	27	0	0	4	3	22	
Unit 6	4	38	0	0	6	4	32	
Total	20	188	0	0	31	19	158	

Percentage	10%	90%			15%	9%	76%	
Percentage Change in Fuel Model					Plus 5%	Minus 81%	Plus 76%	

4.3.3 Sensitive Flora and Special Considerations

Effect of Alternative 1, 2 and 3 on Sensitive Plants

The Absaroka Goldenweed locations are generally in areas that would not burn due to the rocky, shallow soils with insufficient fuels to carry fire.

The determination is that the No Action Alternative and the Action Alternatives may impact individuals but are not likely to cause a trend to federal listing or loss of viability of sensitive plants.

Effect of Alternative 1 on Noxious Weeds

Under the No Action Alternative, current management levels of noxious weed control will continue.

The high risk of large, high-intensity fires is not reduced under this alternative. A large fire would affect the watersheds, primarily by creating a large-scale disturbance across the landscape with direct impact to soil health and productivity. The indirect effects include possible increases in the spread of non-native plants and noxious weeds.

Effect of Alternative 2 and 3 on Noxious Weeds

Personal use firewood cutting has been occurring within 300 feet of the roads in the area. At current weed infestation levels, firewood cutting or burning units adjacent to the highway would not cause a substantial increase in weed density. Any increases would be treated during annual spraying and monitoring of weed sites. Treatment would be in accordance with the existing noxious weed EA.

Effect of Alternative 1 on White Pine Blister Rust

The no action alternative would not have a measurable effect on dwarf mistletoe, foliar diseases, beetles, and white pine blister. The potential spread of blister rust involves an alternative host (current or gooseberry) and the spread to other trees. This process and other damaging agents of limber pine are likely to continue in the area.

Effect of Alternative 2 and 3 on White Pine Blister Rust

The action alternatives would help reduce the populations of the damaging agents (dwarf mistletoe, white pine blister rust and foliar diseases) of limber pine (reference 159).

4.4 Wildlife/Issue: Big Game Security, Winter Range, Proposed, Threatened and Endangered, Sensitive Species and Management Indicator Species (MIS)

4.4.1 Proposed, Threatened and Endangered, and Sensitive Species

This wildlife analysis is based upon estimating the effects of changes in vegetation type, timber age classes, community composition, and yearlong suitability of habitat related to the mobility of management indicator species (and other species of concern) as required by the Code of Federal Regulations [CFR 219.19(a)(1)]. Additional and supporting information relative to wildlife can be found in the Biological Evaluation (BE) contained in the project files.

Effect of Alternative 1 on Proposed, Threatened and Endangered, and Sensitive Species

In the short-term, conditions throughout most of the project area would remain much as they are now. Wildlife species composition would not change appreciably.

In the event of a stand replacement fire, conditions would favor an array of wildlife species adapted to more open grass/shrub habitats, along with those able to take advantage of the proliferation of standing snags and downed woody debris.

Canada lynx - With the No Action Alternative, interspersed and structure will continue as present, which is below optimum in many areas, conifer encroachment will continue into open areas and timbered stands will advance in succession to decadent stands. It is predictable that in the long-term wildfire will intervene in a random manner, and it is quite likely that forage/cover ratios, patch sizes, age class distribution, and denning habitat would be well below optimum for lynx.

Grizzly bear - The No Action Alternative most likely would result in continued succession toward climax, resulting in the overall habitat capability being less than optimum for bear habitat.

Bald eagle - The project sites do not appear to provide the aquatic habitat, suitable nesting structures, or prey base during brood rearing season to offer habitat of more than incidental use.

Grey wolf - No action would have negligible effect on the wolf due to its high mobility and abundance of prey species.

The determination is that the No Action Alternative is not likely to adversely affect the Canada lynx, grizzly bear, bald eagle, or gray wolf or their habitats.

Effect of Alternative 2 and 3 on Proposed, Threatened and Endangered, and Sensitive Species

Canada lynx - With the action alternatives, enhancement of interspersed types and structure as by this patchwork of burns would likely have beneficial effects for snowshoe hare (the primary prey species of the lynx) over the long-term. In addition, so long as the scattered patches of timber of 30 acres or more are maintained, special habitat needs such as denning can be provided for.

Although the Dead Indian portion of the treatment area contains (and will continue to provide) some mature timber, preferred denning habitat appears very limited due to the steep slopes.

Grizzly bear - The proposed action alternatives would not alter overall habitat conditions for bears in the drainage, or increase the potential for grizzly/human conflicts and bear mortalities. If anything, the long-term consequence of the action alternatives in the Dead Indian area would result in the increase of some food sources (early succession plants) for the bear, due to setting back the seral state in many stands. In addition, regeneration of a portion (147 acres or approximately 50%) of the stands containing whitebark pine would be beneficial in the long-term so long as healthy cone-producing stands are left untreated.

Bald eagle - In addition, the action alternatives would not result in an increased potential for significant alteration of habitat conditions in the drainage, or potential for direct eagle mortality.

Gray wolf - Either of the action alternatives for vegetative treatment and subsequent land usage would not contribute in any significant way to modifying the existing prey base for wolves, or significantly increase the potential for direct wolf mortality when compared to the existing situation. Due to the existing forage/cover ratios being well below optimum for deer and elk, providing more early succession stands in the long-term would be beneficial for the wolf, whose primary prey species are deer and elk.

The determination is that either of the proposed action alternatives is not likely to adversely affect the Canada lynx, grizzly bear, bald eagle, or gray wolf or their habitats.

4.4.2 Sensitive Fauna

Effect of Alternative 1 on Sensitive Fauna

Under the No Action Alternative, there is no direct effect or additional risk to the existing condition for sensitive fauna. This alternative would not reduce fuel accumulations, indirectly increasing the risk of a large, uncontrollable fire in the area over the long-term. These catastrophic fires affect old growth mixed conifer stands. Interspersed stands of greater than 30 acres with canopy coverage of more than 70% are at risk in large, stand replacement fires. These potential large-scale disturbances across the landscape would impact sensitive fauna habitat.

The determination is that the No Action Alternative may impact individuals but is not likely to cause a trend to federal listing or loss of viability of sensitive fauna such as the pine marten, fisher, wolverine, northern goshawk, or Boreal owl.

Effect of Alternatives 2 and 3 on Sensitive Fauna

Marten - The proposed action on the Bald Ridge Project would have no effect on the pine marten or its habitat, as marten habitat does not exist in the treatment area.

However, with the Dead Indian Project, the action alternatives would result in portions of old growth mixed-conifer stands being set back to early successional stage. Depending on the intensity

of the burn, the amount of preferred marten habitat would be decreased and individuals may be displaced or some mortality may occur. So long as a portion of mature timber stands of more than 30 acres with canopy coverage of more than 70% remain interspersed throughout the area, adequate quality marten habitat would be provided.

Fisher - The proposed Bald Ridge Project would have no effect on fishers or the habitat usually preferred by this species, as such habitat does not exist in the treatment area.

The Dead Indian Project may have some adverse effects on potential habitat, although it is very unlikely that fishers actually use the area. Depending on the intensity of the burn, the amount of preferred fisher habitat would be decreased and individuals may be displaced. So long as a portion of mature timber stands of more than 30 acres with canopy coverage of more than 70% remain interspersed throughout the area, adequate quality fisher habitat will be provided.

Wolverine - Because of the species' intolerance of human activity (project areas have seasonal high levels of human activity), its large home range requirement, as well as its wide variance in habitat requirements; none of the alternatives being considered are likely to have any significant positive or negative effects on this species or its habitat.

Northern goshawk – So long as treatment associated with the action alternatives does not occur during the nesting period around active nests, the activities associated with any of the proposed actions are not likely to have any significant positive or negative effects on the habitats associated with this species or on specific individuals or population segments of the species. By creating a mosaic of vegetation with mature timber stands interspersed with earlier seral stands, goshawk foraging areas would likely be enhanced.

Boreal owl - Preferred Boreal owl habitats could be affected by the action alternatives, due to loss of old growth components within the actual stands treated. However, due to the fact that either of the action alternatives would create interior openings within mature timbered areas, the owl's preferred habitat is enhanced.

The determination is that either of the proposed action alternatives may impact individuals but is not likely to cause a trend to federal listing or loss of viability of sensitive fauna such as the pine marten, fisher, wolverine, northern goshawk, and boreal owl.

4.4.3 Featured Species

Effect of Alternative 1 on Featured Species

Under the No Action Alternative, elk hiding and thermal cover would not be directly reduced; neither would mountain big sagebrush on deer winter range. This alternative will not reduce fuel accumulations, indirectly increasing the risk of large, high-intensity fires in the area negatively affecting resource values over the long-term.

These hard to control fires affect vegetation and watersheds, primarily by creating large-scale disturbances across the landscape with direct impact to vegetation. The indirect effects include

decreases in elk hiding and thermal cover, and deer winter range should a large fire occur.

Effect of Alternatives 2 and 3 on Featured Species

Elk – As the timber-cover/forage ratio for the area is well above optimum for elk in the general area of proposed treatment, effects relative to the action alternatives are beneficial both short-term and long-term. This evaluation is based on the mitigation constraints relative to maintaining 40% of the stands, interspersed throughout the area, in mature timber; in patch sizes of more than 30 acres with more than 70% canopy cover. This enhances early succession habitat, while simultaneously providing hiding cover, thermal cover, and old growth components for all species. In addition, the majority of the areas burned will not result in stand replacement burns, which would cause reversion to early seral of all burned area. Only a portion of the burned stands can be expected to be burned to the degree that they would revert to early seral.

The conclusion is that the Modified Proposed Action (Alternative 3) would be the most beneficial for elk, as sufficient hiding cover would be interspersed throughout the area. The proposed action (Alternative 2) would be beneficial from a habitat capability standpoint, however, due to less optimum interspersed, displacement by hunters would likely result in portions of the area due to the loss of essential hiding cover.

Deer – Deer use sagebrush areas for both foraging and bedding, and is therefore an important component of deer range, as well as being an important species for many other species and diversity in general. Regeneration of a portion of stands in order to assure their continued existence, as well as to enhance their vigor and condition over the long term would be beneficial. However it is very important to maintain a good interspersed of stands throughout the sagebrush/grassland type by treating only 1/3 to 1/2 of the type per unit area by stripping or burning on in patches.

The conclusion is that either of the proposed action alternatives would be beneficial to long-term availability and condition of the sagebrush type relative to deer as well as many other species.

4.5 Watershed/Issue: Soil, Water, Riparian and Aquatic Resources

This section discusses effects on these components of the watershed: soils, riparian areas, wetlands and floodplains, aquatics, and fisheries.

4.5.1 Soils

Effect of Alternative 1 on Soils

The risk for large fires is not reduced under Alternative 1. A high probability exists that a large, high-intensity fire would affect the watershed, primarily by creating large-scale disturbances across the landscape with direct impact to soil health and productivity.

The indirect effects include possible increases in surface and mass erosion, nutrient loading and sedimentation affecting the watershed should a large fire occur. Regional guidelines (FS 2509.18-

92-1) for soil health and productivity state that no more than 15% of an area will be left in a detrimentally compacted, displaced, puddled, severely burned, and/or eroded condition. A large, intense fire would likely exceed these guidelines.

Effects of Alternative 2 and 3 on Soils

Under these action alternatives, the prescribed burn and fire wood collection (Bald Ridge) would be at a time of low to moderate soil moisture conditions. Compaction, displacement, and puddling, would be minimal within the units that will have firewood collection because it would be conducted during dry soil conditions. Timing of the burn and the mosaic fuel pattern would keep soil burn intensity in the low to moderate ranges. These parameters would minimize the effects and keep the project in compliance with the guidelines that no more than 15% of an area would be detrimentally compacted, displaced, puddled, severely burned, and/or eroded condition.

Soil fertility/productivity depends on organic matter and nutrients. Productivity can be degraded if humus and topsoil, or even excess leaves and limbs, are taken offsite. Under Alternative 2 and 3, coarse woody debris will be left at the rate of 8 to 12 tons/acre (reference 152). This material would provide source material for woody decomposition.

Indirectly, this activity would lead to a flush release of nitrogen that would be rapidly used by new plant growth. However, some of this rapid release would be in a volatile state and lost in the atmosphere while the rest may become soil mobile (moving offsite). The movement offsite would be minimal given the low intensity of the prescribed fire.

Erosion and Sedimentation (Soil Ratings) - Most sediment delivered to streams comes from a source zone along streams whose width depends on topography, soils, and ground cover. The connected disturbed areas like roads and other disturbed soils near streams can deliver sediment during runoff events. Sediment deposits in streambeds harm insect populations and fish reproduction. Each alternative carries the risk of sediment delivery from the existing transportation system to the drainage network's streams, lakes, and ponds.

Using the Water Erosion Prediction Project (WEPP model, reference 132), the amount of on site erosion for both alternatives has been calculated. The WEPP model is a complex computer program that describes the processes that lead to erosion. These processes include infiltration, runoff; soil detachment, transport, and deposition; and plant growth, senescence (aging), and residue decomposition. The model daily calculates the soil water content in multiple layers and plant growth/decomposition. However, it must be noted that WEPP is only a model and it is only a comparison tool. Proportions rather than exact amounts should be compared.

Effect of Alternative 1 on Erosion and Sedimentation

Under the No Action Alternative, there is no direct effect or additional risk to the existing condition for soil movement, erosion, and sedimentation. This alternative would not reduce fuel accumulations, indirectly increasing the risk of a large, intense fire and associated impacts such as erosion and sedimentation to the watershed over the long-term.

In the case of a severe fire, surface erosion would increase to 1.6-3.9 tons/acre from the .94-2.2 tons/acre calculated for Alternatives 2 and 3 (WEPP model, reference 132). The calculations are available in the project file.

Effect of Alternative 2 and 3 on Erosion and Sedimentation

None of the alternatives carry a substantial risk of sediment delivery from the acreage being prescribed burned. This is due to the location of the treatment units, the amount of low-severity (soil heating) fire, and the amount of low intensity fire in the proposed units. Under both Alternative 2 and 3 surface erosion amounts would be minimal until forest cover is reestablished. All units except Dead Indian burn unit 5 would have rapid understory vegetation regrowth. The understory found in the habitat type in this unit 5 would take longer to provide ground cover.

The Dead Indian project would have prescribed fire that will range the entire spectrum of intensity. Fire intensity is considered either high or low. It should be noted that, fire “intensity” is different from fire “severity” ratings used in assessing soil heating effects. Typically, prescribed fire conditions yield lower soil heating effects than wildfire conditions. Usually areas of hydrophobic (water repellent) soils are limited, leading to what is considered a “low fire severity rating.” High severity ratings are given when soil heating is great enough to create persistent hydrophobic conditions. These conditions can lead to dramatic soil loss during summer high intensity thundershowers.

When implemented, Alternative 2 and 3 would have minimal direct sediment additions to Dead Indian or Paint Creeks to affect water quality. There would be minimal sediment delivery to Dead Indian Creek, which flows into the Clarks Fork of the Yellowstone, to indirectly affect water quality.

WEPP estimated values were found to be less than .94-2.2 tons/acre for the Bald Ridge project and 2.2-3.9 for the Dead Indian project under alternatives 2 and 3. To put this data in perspective, 1/10 of an inch of soil lost over an acre is estimated at 16 tons/acre. The actual model data can be found in the project file, and is available upon request. In the short-term, it is estimated that after five years the surface erosion rate will be negligible.

4.5.2 Aquatics Species and Habitats

Riparian Ecosystems (Riparian Areas, Wetlands and Associated Flood Plains)

Effect of Alternative 1 on Aquatic Species and Habitats (riparian, wetlands, flood plains)

Under the No Action Alternative, there is no direct effect or additional risk to the existing condition for bank destabilization, damage to riparian vegetation, wetlands and floodplains or flow regimes. Therefore, little indirect effect or risk to water temperature, dissolved oxygen levels, or water purity exists.

This alternative would not reduce fuel accumulations. Without a reduction in fuels, the Forest Service faces an increased risk of high-intensity, stand replacing fires that are difficult to control and may burn entire watersheds, including valuable riparian zones. In the event of a large scale wildfire, water temperature, dissolved oxygen levels, and water purity will be indirectly impacted if the watershed and riparian areas intensively burn.

Effect of Alternative 2 and 3 on Aquatic Species and Habitats (riparian, wetlands, flood plains)

None of the proposed activities would occur directly within riparian areas. Firewood cutting operations in designated units would be subject to provisions to protect wetlands and riparian areas and will be implemented in accordance with the Soil and Water Best Management practices. Consequently, the action alternatives will have minimal to no direct effect on riparian ecosystems and associated aquatic values such as water temperature, dissolved oxygen, and water purity. The action alternatives will indirectly benefit riparian habitat over the long term by reducing fuel accumulations and risk of large, wildfire events in the area.

Alternative 2 and 3 will have minimal direct sediment additions to Dead Indian or Paint Creek to affect water quality. Therefore, indirect sediment delivery into the Clarks Fork of the Yellowstone River to affect water quality is also minimal.

Streambed and bank stability can be damaged from trampling by animals or humans, vehicle impact, degraded bank vegetation, or excessive flow augmentations. Streams can be made wider and shallower, pools and overhanging banks can be destroyed, and increased sediment can be added to streams. Neither of the alternatives involves burn units within riparian areas or actions that affect streambed and bank stability.

Composition and structure of riparian vegetation can be changed by actions that remove certain species and age classes, but since no active ignition will occur in riparian areas the likelihood that riparian vegetation would be affected is low. Cold winter temperatures and stream icing reducing over-wintering habitat, can be a concern if streams become wider and shallower than natural and/or if excessive vegetation is removed from stream banks. The likelihood of this occurring is also low; as is the chance of increasing summer water temperatures or decreasing dissolved oxygen levels.

Areas of commercial livestock use in riparian areas, such as Dead Indian Creek, are outside the burn units and there is not a direct effect or relationship between the burn units and grazed riparian areas on Dead Indian Creek. In fact, cattle that graze along Dead Indian Creek are in a different allotment than the burn units and permitted cattle use numbers up or down would not be affected by the action alternatives.

Wetlands control runoff and water quality, recharge ground water, and provide special habitats. Actions that may alter their ground cover, soil structure, water budgets, drainage patterns, and long-term plant composition can impair these values. Floodplains are natural escape areas for floods that temper flood stages and velocities. Flow regimes can be altered by major changes in cover type or ground cover, dense road networks, or water projects. Water temperature and chemistry, sediment transport, aquatic habitats, and aquatic life cycles can be degraded.

Hydrologically, the amount of acreage (2,310 acres out of 25,162 acres in the watershed) being treated is minimal. This is about 9% of the total analysis area. Only 50% is planned for a low-intensity burn, which will result in less than 5% of the watershed or analysis area being treated. Because of this, effects on flow regimes and the capability of any wetlands to function as a water

quality filter and facilitate groundwater recharge are minor with proper administration, compliance, and monitoring. Moisture conditions within any wetlands will not be affected by the proposed activities because of the low intensity of the burn prescriptions. Streams in the project area have access to their floodplains, and flood hazard will not be affected by the proposed activities. Consequently, the action alternatives will have minimal to no direct effect on riparian ecosystems, wetlands, or flood plains.

Fisheries-Management Indicator Species. All current fish species upstream of the impassable falls on the Clarks Fork River near the Forest boundary have been stocked at some time. The Wyoming Game and Fish Department (G&F) found that current game trout species in Dead Indian Creek include rainbow trout, rainbow-cutthroat hybrids and Yellowstone cutthroat trout (that are periodically planted by G&F). There are no fish in Paint Creek on the Forest and no Yellowstone cutthroat trout off Forest. The Blaine Creek drainage is fishless.

Over the long-term, there would be overall beneficial effects to fish and fish habitat. These types of prescriptions will help prevent catastrophic fire and more severe impacts to fish and fish habitat.

There would be some short-term direct impacts from removal of upland vegetation, which would result in increased fine sediment delivered to the stream. As proposed, the effect of the action alternatives would be an increase in instream fine sediment that would be minimal and well within the natural range of variability. Indirectly, there will be an increased nutrient delivery to the streams that has been tied up in the soils resulting in a more productive stream system.

Effect of Alternative 1 on Fisheries Management Indicator Species

Under the No Action Alternative, there is no direct effect or additional risk to the existing condition for fisheries. This alternative would not reduce fuel accumulations, indirectly increasing the risk of large, uncontrollable fires in the area over the long-term. These large fires affect watersheds, primarily by creating large-scale disturbances across the landscape with indirect impacts to fish and fish habitat.

If large, expansive areas were burned, a direct effect is that excessive fine sediment levels could result. This would layer the stream bottom, plugging interstitial spaces, reducing spawning success and insect productivity in the short term. Indirectly, this would result in reduced fish survival and growth.

The determination is that the No Action Alternative may impact individuals but is not likely to cause a trend to federal listing or loss of viability of the Yellowstone cutthroat trout.

Effect of Alternative 2 and 3 on Fisheries Management Indicator Species

For the action alternatives for both Dead Indian and Bald Ridge, these proposed burns and firewood harvest units are scattered on the landscape with varying intensity levels. Historically, even more acreage would burn in a catastrophic wildfire than is currently planned in these areas under these alternatives (See Vegetation/Fuel Loading section). As a result, there will be overall beneficial long-term effects to fish and fish habitat.

These types of burn prescriptions would help prevent large scale, high-intensity catastrophic fires and potential severe, direct impacts to fish and fish habitat. There would be some short-term impacts from removal of upland vegetation that would result in increased fine sediment delivered to the stream. Instream fine sediment increases would be minimal and well within the natural range of variability. Within tolerable limits, increased stream sediment also increases nutrient delivery to the stream that has been tied up in the soils. Up to a point, this increased nutrient loading would result in a more productive stream environment for aquatic biota.

The determination is that either of the proposed action alternatives may impact individuals but is not likely to cause a trend to federal listing or loss of viability of the Yellowstone cutthroat trout.

4.6 Cumulative Effects

The following discussion addresses the collective effects of the alternatives on the landscape. It may take from three to five years to implement all the proposed treatments in the action alternatives.

Cumulative Effect of Alternative 1

With current management practices and heavy fuel accumulations, the probability of a large wildfire in the 49,000-acre fire analysis area is high over the next 10 years without controlled burning.

Air quality would not be affected until a wildfire escapes initial attack efforts. At that time, there would be a higher level of particulate matter released than prescribed burning because of the greater amount of fuel consumed. The eventual wildfire would have a much different impact than what a prescribed fire would have under a controlled situation. Prescribed fire impacts usually last for a short period of time and are managed and mitigated. Air quality from wildfires could be impacted for weeks.

Over the long-term (>10 years) however, the forest becomes increasingly vulnerable to large scale, stand-replacing wildfire. In the late seral forest in this area, the risk of damaging wildfire is increasing. Heavy fire suppression activities in the past century have led to an excessive buildup of heavy fuels. Historically, fires were occurring more often and less intense, creating an agent for clearing out understory vegetation and lower ladder fuels. Thus, historical fires were understory fires more than crown fires, and they generated less root killing heat intensity.

Cumulative Effect of Alternative 2 and 3

In a three to five year project implementation timeline, these are the cumulative effects.

Health and Safety. Air quality would not be affected until prescribed burning was implemented. At that time, there would be particulate matter released into the air. Prescribed fire impacts usually last for a shorter period of time than a wildfire and are managed and mitigated. By creating fuel breaks and reducing fuel loading, public health and safety and protection of property is enhanced.

Aesthetics and Recreation. There is some diversity in vegetative pattern, color, and texture in the existing landscape. Introducing the described activities in the 25,162-acre watershed analysis area would have a temporary minor effect (<3 years). However, these visual effects to the landscape would appear natural over time (>3 to <10 years), enhancing the dead and dying limber pine trees now existing on the landscape.

Displacement and stress on big game would occur temporarily from the proposed activities. Helicopter use to aerially ignite the one unit in wilderness as proposed would cause a loss in quality of experience for an estimated period of three to five days for recreationists and hunters during the activity in an approximate two square mile area. Due to the short duration of the helicopter use and the relatively small area affected, little effect on hunting is anticipated.

Vegetation and Fire/Fuel Loading. With implementation of either action alternatives to reduce heavy fuel accumulations, the probability of a large wildfire in the 49,000-acre fire analysis area is reduced over the next 10 years and beyond. Fires that do occur would be easier to control and the threat to private land and developments is reduced. At this time, no timber sales are projected in the watershed. No other fuel breaks or fuels reduction projects are proposed in the immediate vicinity.

Wildlife. The wildlife analysis was based on a 14,105-acre diversity unit and looked at temporary (<3 years), short-term (3 to 5 years) and long-term (>10 years) to evaluate effects.

The proposed action (Alternative 2) would be beneficial from a fuels reduction standpoint, however, due to less optimum interspersions; it would substantially reduce essential elk hiding cover.

The Modified Proposed Action (Alternative 3) eliminated the potential 25-acre post and pole sale area and mitigates the loss of essential elk hiding cover while reducing fuel loading.

As a result of the proposed action alternatives, overall habitat conditions for grizzly bears in the Dead Indian area may benefit from the increase of some food sources (early successional plants) for the bear, due to setting back the seral state in many stands. In addition, regeneration of a portion (147 acres or approximately 50%) of the stands containing whitebark pine would be beneficial in the long-term.

The cumulative effects of the proposed activities on the affected wildlife species and their habitat, when considered in the context of conjunction with other past, present, and future activities, are negligible. This is primarily due to the fact that the effects are beneficial in the long-term, and this action has such minimal effects when considered in the context of the whole relative to wildlife.

Soil, Water, Riparian, and Aquatic Resources. The action alternatives are designed to restore conditions through a combination of natural processes and management actions. The action

alternatives pose very low risk of adversely affecting the hydrologic regime, riparian areas, water quality and important aquatic and terrestrial habitat in the short (three-five years) and long-term (five-ten years) relative to the 25,162-acre watershed. These actions would accomplish the desired objectives to protect the watershed from large and hard to control fires, allow for wildland fire use and prescribed fires to reduce fuel accumulations, and restore scenic qualities.

Disturbance from other on-going activities within the 25,162-acre watershed area, including recreation and grazing would be expected to be minor. Grazing will not be allowed on the burn units for two growing seasons.

4.6.1 Probable Environmental Effects That Cannot Be Avoided

The action alternatives are designed to pose short-term effects, with low risk of adversely affecting the hydrologic regime, riparian areas, and important aquatic and terrestrial habitat. Mitigation activities, such as Best Management Practices (project file), were an important element of project analysis and design. Impacts are usually most evident shortly after implementation. Examples of such impacts include soil disturbance, loss of vegetation, modification of wildlife habitat, and modifications of scenic values.

A loss of vegetation will occur in the burn areas. Grasses, shrubs and trees will revegetate an area overtime. With the passing of time and the application of specified mitigation measures, all impacts from management actions will be within acceptable limits specified by law and the Forest Plan.

Big game will be displaced temporarily, affecting hunter success and the quality of the hunting experience. Effects are short term and reversible.

4.6.2 Irreversible and Irretrievable Commitments of Resources

The only identified irreversible and irretrievable commitments of resources that have been identified are the use of petroleum products. Petroleum products are gone when used.

4.6.3 Summary of the Relationship Between Short-term Uses and Long-term Productivity

While there would be temporary impacts from both action alternatives in both the short and long-term, overall productivity of the land would be maintained.

Fire is a natural process and can be used effectively to contribute to the long-term sustainability of habitats and aquatic, hydrologic, and riparian goals and objectives. The integrity of natural processes would increase as more natural vegetation patterns return to the landscape through the use of prescribed fire.

The temporary impacts of smoke from prescribed burning would have minor short-term effects on air quality.

The emphasis of the project proposals is on maintaining and restoring forest ecosystem health,

reducing long-term risks to resources, and achieving sustainable resource conditions through management activities and natural processes. Management activities are designed to reduce long-term risks to habitats while contributing to social and economic needs of people. By reducing the effects of fire exclusion, temporary (three years or less) and short-term (three-ten years) impacts or uses are outweighed by the long-term increase in productivity and the decrease in potential large wildfire events.

The greatest impact to productivity is the impact that could occur as the result of a large, high intensity wildfire. While a fire of this nature is possible under any alternative, long-term productivity is most at risk with the No Action Alternative because it would have the greatest risk for intense wildfires. These stand replacement kinds of fires can have lasting effects on soil/water; hence, affecting long-term productivity. This also holds true for impacts associated with noxious weeds, whose presence can adversely affect the ability of the land to be healthy and productive because the greatest potential for noxious weed spread is under a large wildfire scenario.

In summary, the use of prescribed and wildland fire to restore and maintain vegetative composition and structure, to reduce fuel accumulations, and to recycle nutrients, will be beneficial to long-term productivity.

4.7 Specifically Required Disclosures

Effects to Proposed, Threatened and Endangered, and Sensitive Species

No significant impacts to any proposed, threatened or endangered terrestrial or sensitive aquatic species, or sensitive species are expected under any of the alternatives.

Effects on Wetlands and Floodplains

The application of Best Management Practices and project design criteria/mitigation measures will result in minimal effect to wetlands/floodplains and will protect the beneficial uses.

Effects on Heritage Resources

The action alternatives are designed to meet the legal requirements for protection of, or the mitigation of impacts to, significant cultural resources. A heritage survey was completed for these projects. Design and mitigation requirements will result in a “no effect” to these resources under any of the alternatives.

Effects on Energy Requirements

The action alternatives would require the use of petroleum products for implementation to proceed. The impacts on energy resources are insignificant considering national and worldwide petroleum resources.

Effects on Social Groups and Environmental Justice

Implementation of any alternative would not result in disproportionate impacts to any minority or low-income communities. The effects on social groups would be similar for each alternative. There are no identified differences in effects on Indians, women, or civil liberties of any American citizen. All the alternatives would have similar effects on all people, regardless of race, religion, and sex.

Effects on Wilderness

The action alternatives would have a short-term minimal effect on designated wilderness due to noise and temporary loss of solitude. Long-term benefits include the return of fire to a more natural role in the ecosystem.

